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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,467	09/25/2003	Gee-Sung Chae	041933-5234	4568
9629	7590	01/19/2006	EXAMINER	
MORGAN LEWIS & BOCKIUS LLP 1111 PENNSYLVANIA AVENUE NW WASHINGTON, DC 20004			VINH, LAN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 01/19/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/669,467

Applicant(s)

CHAE ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) 6-8, 10-12, 25-27, 37 and 39 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18-22, 24, 28-32, 40-50 and 55 is/are allowed.
- 6) ☒ Claim(s) 1-5, 9, 13-17, 23, 33-36, 38 and 51-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Election/Restrictions

1. Applicant's election with traverse of Species 1a (etching the Ti layer includes applying an etching solution having an acid) and Species 2a (removing the TiOx pattern includes applying the etching solution having H₂SO₄) in the reply filed on 11/04/2006 is acknowledged. The traversal is on the ground(s) that the Examiner's restriction requirement is improper because the species are divided by the etching means, not processes, structure or other technical feature. This is not found persuasive because it is noted that "Species may be either independent or related under the particular disclosure. Where species under a claimed genus are not connected in any of design, operation, or effect under the disclosure, the species are independent inventions. See MPEP § 802.01 and § 806.06. In this case since the species are grouped by independent inventions (etching/removing using acidic solution, alkaline solution and etching gases), the requirement is still deemed proper and is therefore made FINAL.

Although the applicants identified the species that is elected consonant with this requirement in the reply filed on 11/4/2005, the applicants failed to list all claims readable thereon, including any claims subsequently added. Therefore, claims drawn to non-elected species (claims 6-8, 10-12, 25-27, 37, 39,) are considered withdrawn from consideration

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 9, 23, 51-54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 recites the limitation "the etching solution " in claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 23 recites the limitation "the hydrophobic surface " in claim 18. There is insufficient antecedent basis for this limitation in the claim.

Claim 51 recites the limitation "the second metal ". There is insufficient antecedent basis for this limitation in the claim. Claims 52-54 are indefinite because they depend on claim 51

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 15 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamazaki et al (US 6,004,831)

Yamazaki discloses a method for fabricating a thin film semiconductor device.

The method comprises the steps of:

forming an etching-subject layer 104 on a substrate (col 3, lines 15-17; fig. 1A)

forming a Ti layer 106 on the etching-subject layer (col 3, lines 30-37)

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oxidizing a portion of the Ti layer to form an Tiox pattern (col 4, lines 15-20)

etching the etching-subject layer using the Tiox pattern as a mask (col 7, lines 55-60)

removing the Tiox pattern (fig. 2 shows that TiOx pattern 109 is removed)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-5, 13-14, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US 6,004,831) in view of Umezaki et al (US 4,288,283)

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Yamazaki discloses a method for fabricating a thin film semiconductor device.

The method comprises the steps of:

forming an etching-subject layer 104 on a substrate (col 3, lines 15-17; fig. 1A)

forming a Ti layer 106 on the etching-subject layer (col 3, lines 30-37)

oxidizing a portion of the Ti layer to form an Tiox pattern (col 4, lines 15-20)

etching the etching-subject layer using the Tiox pattern as a mask (col 7, lines 55-60)

removing the Tiox pattern (fig. 2 shows that TiOx pattern 109 is removed)

Unlike the instant claimed inventions as per claims 1-3, 16, 17, Yamazaki fails to specifically disclose irradiating light on a portion of the Ti layer using a mask to form a TiOx pattern

Umezaki discloses a method for forming a microscopic pattern comprises the step of irradiating UV light on a portion of the Ti layer using a mask to form a TiOx pattern (col 3, lines 20-30)

One skilled in the art at the time the invention was made would have found it obvious to modify Yamazaki method by irradiating UV light on a portion of the Ti layer using a mask to form a TiOx pattern as per Umezaki because Umezaki discloses that thick TiOx is obtained in executing the oxidation with UV light, it acts very effectively as a reflection reducing film (col 3, lines 29-32)

Regarding claims 4-5, Yamazaki discloses applying a HF solution to the metal electrode (col 7, lines 57-60)

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Regarding claims 13-14, Yamazaki discloses forming the layer 104 of insulating film (col 3, lines 15-17)

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US 6,004,831) in view of Umezaki et al (US 4,288,283) and further in view of Suguro (US 2001/0033023)

Yamazaki as modified by Umezaki has been described above. Unlike the instant claimed invention as per claim 9, Yamazaki and Umezaki fail to disclose removing the TiOx pattern by using an etching solution having sulfuric acid

Suguro discloses a method for manufacturing a semiconductor device comprises the step of removing a TiOx layer/pattern by using an etching solution having sulfuric acid (col 4, paragraph 00520)

One skilled in the art at the time the invention was made would have found it obvious to modify Yamazaki and Umezaki method by removing the TiOx layer pattern using an etching solution having sulfuric acid as per Suguro because Suguro discloses that hot sulfuric acid should better be used as an etching solution to remove TiOX film (col 4, paragraph 0052)

6. Claims 33-36, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US 6,004,831) in view of Umezaki et al (US 4,288,283)

Yamazaki discloses a method for fabricating a thin film semiconductor device. The method comprises the steps of:

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forming an etching-subject layer 104 on a substrate (col 3, lines 15-17; fig. 1A)

forming a Ti/metal layer 106 on the etching-subject layer (col 3, lines 30-37)

oxidizing a portion of the Ti layer to form a Tiox pattern/metallic oxide layer and non-oxidized metal layer portion (col 4, lines 15-20, fig. 1C)

removing the non-oxidizing metal layer by immersing the semiconductor structure in an etching solution/first etching means (col 4, lines 12-17; fig. 1C)

etching the etching-subject layer using the Tiox pattern as a mask (col 7, lines 55-60)

removing/etching the Tiox/metallic oxide pattern (fig. 2 shows that TiOx pattern 109 is removed)

Unlike the instant claimed inventions as per claim 33, Yamazaki fails to specifically disclose the step of etching the metallic oxide layer using a second etching means

Umezaki discloses a method for forming a microscopic pattern comprises the step of etching the metallic oxide using plasma etching/second etching means (col 3, lines 55-60)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Yamasaki method by adding the step of etching the metallic oxide using plasma etching/second etching means as per Umezaki because Umezaki discloses that only the exposed part of the TiOx film can be selectively etched and removed using a chemical dry etching (col 3, lines 43-51)

The limitations of claims 34-36 have been discussed above

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7. Claims 51-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US 6,004,831) in view of Umezaki et al (US 4,288,283)

Yamazaki discloses a method for fabricating a thin film semiconductor device. The method comprises the steps of:

- forming an insulating layer 104 on a semiconductor substrate (col 3, lines 15-17; fig. 1A)

- forming a metal layer 106 on the layer 104(col 3, lines 30-37)

- forming an electrode layer comprises of Ti or a multi-layer on the metal layer (col 4, lines 63-66)

- oxidizing a portion of the Ti layer to form an TiOx masking layer portion and a Ti masking portion (col 4, lines 15-20; fig. 1C)

- etching TiOx masking layer to form a TiOx pattern mask (fig. 1C)

- etching the metal layer using the TiOx pattern to form a gate electrode 306 (fig. 3A)

- introducing dopants/ions to the semiconductor substrate to form source/drain regions (col 6, lines 1-7; col 9, lines 53-55)

Unlike the instant claimed inventions as per claim 51, Yamazaki fails to specifically disclose irradiating light on a portion of the Ti/metal masking layer using a mask to form a TiOx masking layer

Umezaki discloses a method for forming a microscopic pattern comprises the step of irradiating UV light on a portion of the Ti layer using a mask to form a TiOx pattern/masking layer (col 3, lines 20-30)

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One skilled in the art at the time the invention was made would have found it obvious to modify Yamazaki method by irradiating UV light on a portion of the Ti layer using a mask to form a TiOx pattern as per Umezaki because Umezaki discloses that thick TiOx is obtained in executing the oxidation with UV light, it acts very effectively as a reflection reducing film (col 3, lines 29-32)

Regarding claims 52, 54, Yamasaki discloses introducing dopants ions to sink under the electrode (col 6, lines 3-7), which reads on introducing dopants ions directly into the semiconductor substrate

Regarding claim 53, fig. 1B of Yamasaki shows that the metal layer 106 is etched simultaneously with the insulating layer 104

Allowable Subject Matter

8. Claims 18-22, 24, 28-32, 40-50, 55 allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 18, the cited prior art of record fails to disclose or suggest a pattern forming method comprises the step of etching the etching-subject layer using the first region of the TiO₂ layer as a mask, in combination with the rest of the limitations of claim 18

Claim 23 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

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Regarding claims 30, 55, the cited prior art of record fails to disclose or suggest a pattern forming method comprises the step of etching a portion of TiOx layer having a hydrophobic surface to form a hydrophilic TiOx pattern, in combination with the rest of the limitations of claims 30, 55

Regarding claim 40, the cited prior art of record fails to disclose or suggest a pattern forming method comprises the step of forming source/drain electrode on the semiconductor layer using a third metal masking layer, in combination with the rest of the limitations of claim 40

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to be 'LV' followed by a stylized flourish.

LV
January 12, 2006